

ATTACHMENT J.4.79

SAFETY ASSESSMENT HAZARD SCREENING AND CLASSIFICATION, NS-0003

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SAFETY ASSESSMENT HAZARD SCREENING AND CLASSIFICATION

NS-0003

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FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

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1.0 PURPOSE

- 1.1 This procedure establishes the process for performing a Safety Assessment and identifies the responsibilities for initiating, documenting, and approving a Safety Assessment. The Safety Assessment includes the initial screening of hazards associated with a new or modified facility, project, or activity.
- 1.2 The Safety Assessment determines the resulting preliminary hazard classification, and the need to develop an in-depth safety basis for the activities containing significant hazards. The Safety Assessment may also be used to identify the design features that are significant to safety. For routinely encountered hazards, a final hazard classification is established and no further safety analysis is required.
- 1.3 More specifically this procedure was developed using a graded approach to incorporate current Department of Energy (DOE) guidance into the hazard analysis/safety basis development process. Special emphasis was placed on DOE Order 5480.23, DOE-STD-1027-92 for radiological hazards and DOE-EM-STD-5502-94 for all hazards.

2.0 SCOPE

- 2.1 This procedure applies to all facilities, projects, and activities (refer to Item 5.7, General Section) operated by Fluor Daniel Fernald (FDF) at the Fernald Environmental Management Project (FEMP) and applies to all FEMP personnel and subcontractors at the FEMP and affiliated locations. Typically, the project engineer initiates the request for a safety assessment.

3.0 REFERENCES

- 3.1 NS-0002, *Unreviewed Safety Question (USQ) Determination and Safety Evaluation System*
- 3.2 NS-0005, *Safety Analysis Reports and Technical Safety Requirements*
- 3.3 WSRC-MS-92-206, *Toxic Chemical Hazard Classification and Risk Acceptance Guidelines for Use in DOE Facilities*, D.K. Craig, J.S. Davis, L.G. Lee, P.J. Lein, and P. Hoffman, Rev. 2, March 24, 1995

4.0 RESPONSIBILITIES

4.1 Requesting FEMP Organization

- Owns all safety analyses requested by, and prepared for, their respective organization. Requests the Safety Analysis Team to support their project in a timely fashion.
- Assigns a responsible project representative to coordinate and support the Safety Assessment process.

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- Requests the designated Safety Analysis Lead/Staff or subcontractor to perform a safety assessment for all activities.
- Determines if an Safety Assessment Plan is required.
- Technically reviews and ensures the Safety Assessment is consistent with project design, plans, and procedures.
- Approves the safety assessment.

4.2 Designated Safety Analysis (SA) Lead/Analyst or Subcontractor

- Notifies the Requesting FEMP Organization if additional inventory data is required to perform the Safety Assessment hazard screening and classification.
- Performs the hazard screening and develops an Safety Assessment Plan.
- Prepares and submits the Safety Assessment and the associated Safety Assessment documentation package for technical review.
- Resolves comments with the Technical Reviewer.
- Obtains approval of the Safety Assessment and the associated documentation package from the Coach of Safety Analysis, and the Project Manager/Engineer of the Requesting FEMP Organization.
- Manages the Safety Assessment project to ensure that it meets the objective of the responsible Requesting FEMP Organization (owner).

4.3 Safety Analysis Peer Reviewer

- Reviews the Safety Assessment and the associated Safety Assessment documentation package for technical adequacy.
- Signs and dates verifications of safety assessment/analysis calculations.

4.4 Coach of Safety Analysis

- Reviews and approves the Safety Assessment and associated documentation package, including the Safety Assessment Plan
- Maintains and stores the approved Safety Assessment.
- Maintains an index of approved and in-progress Safety Assessments.
- Resolves any differences between the SA Lead/Analyst and the Peer Reviewer.

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5.0 GENERAL

5.1 The Safety Assessment is a brief, factual, and objective document that determines if facilities, projects, and activities involve hazards that require elimination, control, or mitigation, and it establishes whether or not further safety analysis and documentation is needed. A Safety Assessment must be developed, containing a preliminary or final hazard classification, for all new projects, activities, facilities, and modifications of these facilities. Also, all decontamination, decommissioning, and demolition of existing facilities, remedial actions, remedial activities, projects, and activities must be analyzed. Thus, all activities at the FEMP must be analyzed and each analysis must be documented in a Safety Assessment.

5.2 The Safety Analysis Program is served by five key processes (see FEMP Safety Analysis Programs Processes diagram in RM-2116):

1. Hazard/USQ Screens and USQD Safety Evaluations
2. Hazard Classifications
3. Auditable Safety Records
4. Safety Analysis Reports
5. Technical Safety Requirements

The Safety Assessment is common to all of these processes as the initiating document. A *Request for Safety Assessment* (see Attachment A), shall be submitted at the beginning of all nonstandard activities/projects to Safety Analysis to ensure integration of the safety analysis program. FEMP facilities, projects, and activities shall, at a minimum, be screened for hazards using the Safety Assessment. This procedure describes how the Safety Assessment is completed to screen and to make the preliminary hazard classification, the first two key processes of the Safety Analysis Program. If a USQ is involved, follow procedures in NS-0002.

5.3 Standard Industrial Hazards (SIHs) and standard construction activities are expedited with a minimal level of review. Facilities/Activities requiring a USQ Screen are also expedited. Requests which do not meet the criteria of Table 1 are assessed for the appropriate preliminary hazard classification. The preliminary hazard classification, based on the best information available, are documented in the Safety Assessment.

5.4 In most cases, the process flow sequence for determining the level of further safety analysis is shown in RM-2116, Attachment C. However exceptions may occur, as approved by FDF or DOE management, due to the unique nature of the proposed facility, project, or activity.

5.5 Following a Safety Assessment Request, a hazard screening is performed to determine if the hazards are significant enough to require an in-depth Safety Assessment hazard assessment and classification. The Safety Assessment should be performed early in the project/activity life cycle to determine the preliminary hazard classification. The preliminary hazard classification governs the requirements for length, scope, and thoroughness of Safety Analysis Reports (SARs), Auditable Safety Records (ASRs), and Operational Readiness Reviews (ORRs). The Safety Assessment may also identify the need to further develop the safety basis to arrive at a final hazard classification in an ASR or SAR. The preliminary hazard classification, as

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arrived at by this procedure, may vary from the final hazard classification arrived at in the SAR/ASR process due to a more in-depth accident analysis and/or discovering more or fewer hazards during development of the SAR/ASR.

- 5.6 *Safety Assessment Guidelines*, Addendum 1 to this procedure, provides technical and administrative guidance to the Safety Analysis Staff/Contractors on approved approaches for performing the Safety Assessment tasks defined in this procedure. By following this guidance consistency is established and maintained. Alternative approaches may be equally acceptable for performing the Safety Assessment tasks. Alternative approaches shall be approved by the Coach of Safety Analysis prior to use.
- 5.7 While it is necessary to have all activities at the FEMP reviewed by Safety Analysis, the majority of the reviews are very brief because the activities are either standard industrial (refer to Table 1) or standard construction hazards, covered by permits, which are expediated through the Safety Assessment process, as described in Section 7.2 of this procedure.

6.0 PREREQUISITES

None

7.0 PROCEDURE

7.1 Initiating the Safety Assessment

NOTE: The safety assessment is typically initiated by the Project Engineer.

Requesting FEMP Organization

1. Complete a *Request for Safety Assessment*, Form FS-F-2706 (see Attachment A).

NOTE: Form FS-F-2706 shall be signed and dated by the requester and the Requesting Organization Manager.

- a. If the project is listed in Table 1, check the "Hazard Screening" block on page 1 of Form FS-F-2706 (see Attachment B).
- b. If the project is NOT in Table 1, check the "Hazard Classification" block on page 1 of Form FS-F-2706, *Request for Safety Assessment* (see Attachment A).
- c. Attach the following information with the *Request for Safety Assessment* or as an alternative, identify where the following project information is available:
 - Basic information on adjacent or the nearest FEMP facility or activity relative to the proposed facility/activity.

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- Basic information or references on the physical layout, area monitoring systems, normal and emergency ventilation, and operation of the facility or activity.
 - Most current engineering information on the project/activity.
 - Estimate by using various methods that the maximum potential quantities of radiological and chemical inventories, their location, and range concentrations.
 - Information on energy sources that could disperse radiological or hazardous materials. The potential energy sources shall include but not be limited to: electrical switchgear, motor control centers, electrical distribution panels, high pressure lines or vessels, rotating equipment, normal and transient combustibles, underground utilities, high energy lines, high temperature equipment or exposed flames, fork lifts, and cranes or conveyors.
 - Number and location of personnel assigned to work in the facility, if known.
 - Information on all known project hazards.
 - Any previous hazard/risk analysis of the activity/project.
 - Basic information or references on any emergency equipment/systems and procedures unique to the area.
 - The names and telephone numbers of contacts to obtain additional information.
 - Known federal, state, and local regulatory code or requirements applicable to the project.
2. Submit the completed *Request for Safety Assessment* form to the Safety Analysis Team or the designated SA Lead.

Coach of Safety Analysis Team

3. Complete the top of page 2 of the *Request for Safety Assessment* form as follows:
- a. Assign the Safety Assessment Identification Number;
 - b. Transmit to the designated SA Lead or assign a Safety Analyst;
 - c. Assign the Safety Assessment completion date based on project requirements; and

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- d. Determine if a Safety Assessment Plan is required and check the appropriate box.
- e. For Human Factors Evaluations (HFE), assign an Safety Assessment Identification Number and transmit to the assigned Safety Analyst.

NOTE: The HFE will be prepared per SA-DPT-004, HFE Methodology.

- 4. Return a copy of the *Request for Safety Assessment* to the Requesting FEMP Organization Manager/Engineer and forward a copy to designated SA Lead or assigned Safety Analyst.
- 5. File the completed original *Request for Safety Assessment* with the associated Safety Assessment documentation package in the SA files.

7.2 Performing the Hazard Screening

Safety Analysis Lead/Analyst

- 1. After receipt of the *Request for Safety Assessment*, conduct a review and/or walkdown of the area, with a knowledgeable person, to verify that there are no personnel or nuclear hazards in adjacent areas and that construction activity does not introduce potential personnel or nuclear hazards to the adjacent areas.
- 2. Using the results of the review/walkdown, perform an initial screening of the potential hazards to determine if:
 - a. The activity only introduces standard industrial and/or standard construction hazards and may include contamination levels covered by permits. Refer to Table 1 for examples of standard industrial hazards. Contact OS&H and Radiological Engineering to ensure the standard hazards have been addressed.
 - b. There is an existing DOE approved safety basis for the facility/process/activity and the proposed changes may introduce an Unreviewed Safety Question (USQ).
- 3. For standard industrial hazard activities that are located on the old process side, ensure the activities will not adversely impact releasable hazardous material exceeding final regulatory quantities in 40 CFR 302.4.

NOTE: If exceeded, the hazard is not standard and cannot be expediated.

- 4. If condition 7.2.2.a of this procedure is met, obtain the Safety Analysis Coach's signature on the request and return to the requestor. (The hazard screening process is complete and the NS-0003 process is terminated.)

NOTE: Attachment A, page 2 presents the Safety Assessment Summary Form.

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5. If condition 7.2.2.b of this procedure is met, check the appropriate boxes on the Safety Assessment Request Form (Attachment A, page 2) and list the assigned USQD number in the Justification section of the form. Obtain the Safety Analysis Coach's approval and initiate the USQD/SE System according to NS-0002.

NOTE: This completes the hazard screening process.

6. If a Safety Assessment is not issued as a result of the screening activity, determine with the Coach of Safety Analysis if a Safety Assessment Plan is required.

7.3 Developing the Safety Assessment Plan

Coach of Safety Analysis

1. Determine if a written Safety Assessment Plan is required. Document the decision on page 2 of Form FS-F-2706, *Request for Safety Assessment* (Attachment A).
 - a. If a written Safety Assessment Plan is required, notify the designated SA Lead/Analyst.
 - b. If a Safety Assessment Plan is NOT required, proceed to 7.4.
2. Determine if additional discipline support is required and acquire support personnel, as needed.

SA Lead/Analyst

3. Discuss the Safety Assessment Plan development with the Coach of Safety Analysis.
4. As directed by the SA Coach, present a written Safety Assessment Plan with assistance from support personnel, as applicable. For additional guidance in developing a Safety Assessment Plan, refer to Addendum 1, *Safety Assessment Guidelines*.

NOTE: Other approaches using sound engineering judgement may be acceptable. Alternative approaches may be used if approved by the SA Coach and indicated or documented in the Safety Assessment Plan.

5. Coordinate the proposed Safety Assessment Plan schedule with the responsible project representative.
6. Submit completed Safety Assessment Plan draft to the SA Coach.

Safety Analysis (SA) Coach

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7. Review the written Safety Assessment Plan and approve if satisfactory. After approval, obtain concurrence from the responsible project representative.
8. File the approved Safety Assessment Plan in the SA files.

7.4 Preparing the Integrated Hazard Analysis

NOTE: An Integrated Hazard Analysis (IHA) will be completed to the extent and depth consistent with the stage of the project and available information. All hazards will be identified and documented, including radiological, chemical, and industrial hazards. For the purposes of establishing the hazard classification, the hazards are to be considered unmitigated (as they exist prior to being mitigated by the project/activity). However, separation (distance) or segmentation, changes in airborne release fractions, and material dispersibility are to be considered.

NOTE: In addition to the responsible project representative, other resource personnel are included in the IHA development; the IHA is integrated with other safety organizations, commensurate with the hazards. The Engineering/design function will always be on the IHA Team, due to their need for the preliminary hazard classification for project development. Relevant disciplines not included in preparing the IHA shall be provided the opportunity to review and comment on the IHA.

SA Lead/Analyst

1. With the responsible project representative, determine the composition of the IHA working members team and/or the IHA review team.
2. If the nature of the activity significantly involves a specific discipline, such as industrial hygiene or radiological engineering, request a Technical Specialist from that discipline to participate in the IHA development.
3. Coordinate the development and production of the IHA along with the assigned technical specialists, as applicable. For additional guidance in developing the IHA, refer to Addendum 1, *Safety Assessment Guidelines*.

NOTE: Other alternative approaches to the IHA may also be acceptable. Alternative approaches shall be approved by the SA Coach and indicated or documented in the IHA.

4. Provide lead technical discipline input and insight into the IHA development.
5. Obtain approval from the SA Coach for any IHA development alternative approach prior to use.
6. Review the IHA prior to the start of 7.5, "Assigning the Preliminary Hazard Classification."

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7. Resolve and document any SA comments.

7.5 Assigning the Preliminary Hazard Classification

SA Lead/Analyst

1. For any preliminary hazard classification alternative approach, obtain approval from the SA Coach prior to use.
2. Based on the information developed in the IHA, assign a preliminary hazard classification to the project/activity. Refer to Addendum 1, *Safety Assessment Guidelines*, for additional guidance in developing the preliminary hazard classification.
 - a. Ensure the preliminary classification is as complete as possible, based on the stage of the project, including radiological, chemical, and any other hazard classifications.
 - b. Take credit for segmentation, changes in airborne release fractions (ARFs), and material dispersibility, as permitted in the guidelines for radiological and chemical hazard classifications.
 - c. Prepare radiological hazard classifications according to DOE-STD-1027-92.
 - d. Prepare chemical hazard classifications according to Addendum 1 of this procedure.
3. Receive and maintain documentation of independent verification of all analyses from the SA Peer Reviewer.
4. Place the analysis and verification documentation in the SA project file after it is reviewed by management.

7.6 Selecting the Next Level of Required Analysis/Documentation

SA Lead/Analyst

1. Based on the preliminary hazard classification and using Attachment C (extracted from DOE-EM-STD-5502-94), determine the facility classification and whether an Auditable Safety Record (ASR), a Safety Analysis Report (SAR), or other safety basis document is required.
2. If an ASR, a SAR, or other safety basis document is NOT required, no additional analysis is needed.
3. Forward the recommendation to the SA Coach for review and finalization of any additional safety analysis/documentation requirements.

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7.7 Completing the Safety Assessment

NOTE: The Safety Assessment shall be completed based on the documentation package and if applicable, the Safety Assessment Report. Page 2 of Attachment A presents the Safety Assessment summary.

SA Lead/Analyst

1. Assemble the Safety Assessment documentation package to include the following:
 - a. Completed *Request for Safety Assessment*, Form FS-F-2706.
 - b. If applicable, approved Safety Assessment Plan.
 - c. Applicable notes, worksheets, calculations, and analyses:
 - Hazard screening,
 - IHA,
 - Assessment and classification of radiological hazards,
 - Assessment and classification of non-radiological chemical hazards,
 - Assessment and classification of industrial hazards, and
 - Assessment and classification of construction hazards, if any.
 - All pertinent data necessary to document Safety Assessment conclusions, including peer reviewed calculations.
 - d. Listing of computer codes (with revisions) that were used for the calculations and analyses, when applicable. This includes all input and results obtained from these codes.
 - e. Copies of reference documents that are not maintained and controlled by FDF or the SA Coach, or are not standard published references.
 - f. If applicable, a complete description of alternate approaches used.
2. As applicable, prepare the Safety Assessment Report. For additional guidance and assistance in completing the Safety Assessment, refer to Addendum 1, *Safety Assessment Guidelines*.

NOTE: The Safety Assessment Report is not typically required for standard industrial and/or standard construction hazards. Standard hazards typically only require the completed "Request for Safety Assessment" form, with the "justification" noted therein. The SA Coach identifies

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standard industrial and/or standard construction hazards that are not typical and need additional analysis.

3. Resolve and document comments from the technical review and the management review.
4. Prepare and sign the Safety Assessment Summary Form.

SA Lead/Analyst

5. Request SA Team staff member to be the Safety Assessment Peer Reviewer, per internal SA procedure.

SA Peer Reviewer

6. Review and comment on the completed Safety Assessment documentation package which includes the Safety Assessment Report and the Safety Assessment request form.
7. Review, verify, sign, and date all calculations.
8. Review the comment resolution with the SA Lead/Analyst.

SA Coach

9. With concurrence of the Requesting Organization Manager, review and approve:
 - Safety Assessment documentation package.
 - Resolution of the technical review, and
 - Safety Assessment Report and Summary Form.

NOTE: The SA Coach's signature on the "Request for Safety Assessment" form indicates approval of the Safety Assessment total documentation package.

10. Review and sign the Safety Assessment Report and the completed "Request for Safety Assessment" form for approval.

Requesting Organization Manager

11. Review and sign the Safety Assessment Report and the completed "Request for Safety Assessment" form for approval.

SA Coach

12. Maintain the Safety Assessment master file copy of the Safety Assessment documentation package and the approved Safety Assessment Report.

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13. Distribute Safety Assessment and Safety Assessment Report according to Table 2.

NOTE: Table 2 represents the required approvals and the distribution list for Safety Assessments. Additions and deletions to the list are at the discretion of the responsible project representative, the SA Lead/Analyst, and the SA Coach, and are typically project specific in addition to standard distribution.

NOTE: The Safety Assessment report is approved by signing the attached Safety Assessment Request form.

7.8 Safety Assessment Revisions

SA Lead/Analyst

1. Prepare Safety Assessment revisions according to this procedure using a graded approach.

NOTE: The approach is at the discretion of the SA Coach and is dependent on the magnitude and complexity of designed and operating changes and the resulting hazard analysis and hazard classification updates required.

2. Mark revised/superseded Safety Assessments as "revised" or "superseded" in the SA file.

NOTE: Revisions, when required by the SA Coach, will typically be generated per this procedure. Revisions, similar to the Safety Assessment, will be graded according to the intensity of the hazards involved.

8.0 RECORDS

- 8.1 Request for Safety Assessment, form FS-F-2706-2

9.0 DRIVERS

- 9.1 DOE Order 5480.23, *Nuclear Safety Analysis Reports*, U.S. Department of Energy, 4/30/92
- 9.2 DOE-STD-3009-94, *Preparation Guide for U.S. DOE Nonreactor Nuclear Facility Safety Analysis Report*, July, 1994
- 9.3 DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Report*, U.S. Department of Energy, December 1992
- 9.4 DOE-EM-STD-5502-94, *Hazard Baseline Documentation*, U.S. Department of Energy, August, 1994

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- 9.5 RM-2116, *System Safety Requirements*
- 9.6 PL-3049, *Implementation Plan for SARs and TSRs at the FEMP, S/RID for Nuclear and System Safety Functional Area*
- 9.7 40 CFR 355, *Emergency Planning and Notification*
- 9.8 29 CFR 1910.119, *Process Safety Management*
- 9.9 *Guidelines for Hazard Evaluation Procedures*. American Institute of Chemical Engineers, 1985 (Source Reference)

10.0 **DEFINITIONS** (Refer to Attachment B for a list of acronyms and abbreviations.)

The definitions in this section are a subset of RM-2116 and are only provided for ease of use.

- 10.1 Administrative Controls - Provisions relating to organization and management, procedures, recordkeeping, assessment, and reporting necessary to ensure safe operation of a facility/activity.
- 10.2 Airborne Release Fractions (ARF) - The fraction of the material at risk that is released to the local environment. The ARF is the airborne portion of hazardous materials released in an accident. Typically, a small fraction (1/1,000) of material (e.g., uranium) will become airborne when an accident (e.g., explosion/earthquake) occurs.
- 10.3 Auditable Safety Record (ASR) - Documentation that contains the Auditable Safety Analysis (ASA) for radiological facilities and certain low hazard, non-nuclear facilities at the FEMP to ensure that construction, operation, maintenance, shutdown, cleanup, and decommissioning activities can be safely performed in compliance with applicable laws, regulations, and requirements. An ASR may be employed when a Safety Assessment concludes that further safety analysis is required. The form of safety analysis may be either FDF or DOE approved, depending on the facility, activity, or project described.
- 10.4 Basis for Interim Operation (BIO) - BIO is a documented demonstration that nuclear facility operations can be conducted at an adequate level of safety until more detailed safety documentation, fully compliant with the requirements of DOE Orders 5480.22 and 5480.23, is developed and approved by DOE. For non-reactor nuclear facilities, a BIO is required for each Hazard Category 1, 2, and 3 facility whose safety documentation does not fully comply with DOE 5480.22 or DOE 5480.23. An approved BIO serves as the interim DOE safety basis until the upgraded safety documentation is developed and approved. (DOE-STD-3011-94)
- 10.5 Facility - A facility or facility boundary includes all buildings, structures, processing equipment, and support/auxiliary systems and equipment in support of a common mission (e.g., decontamination and decommissioning, waste treatment operation) and related experiments and testing. Other considerations may be included such as organizational and management structure and the relative locations of buildings. As used herein, in NS-0003, facility may include any activity.

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- 10.6 **Hazard** - A source of danger (i.e., material, energy source, or operation) with the potential to cause illness, injury, or death to workers or the general public or damage to a facility or to the environment (without regard for the likelihood or credibility of accident scenarios or consequence mitigation).
- 10.7 **Integrated Hazard Analysis** -A qualitative analytical tool [formerly referred to as a preliminary hazard analysis (PHA)] usually performed early in the life of a project or activity to systematically identify, collect, and integrate information, in coordination with representatives of the project/activity and its support organizations as well as site organizations which have programmatic responsibilities for health and safety issues concerning:
- Identification of hazards (materials in quantity, form, and location)
 - Energy sources, potential initiating events, causes of hazardous conditions
 - Consequences of hazardous events without preventative/mitigative measures
 - Preventive/mitigative measures
 - Frequency of occurrence of events (credibility of consequences)
 - Severity of consequences of events
 - Significance of hazards (risk, real and perceived).
- 10.8 **Process Requirements (PR)** -A requirement that ensures a facility, operation, or activity remains safe in accordance with good management practices, routine conditions, and anticipated operating modes. PRs may also be developed and implemented to help ensure that SBRs are not exceeded or otherwise violated. PRs are approved by FDF.
- 10.9 **Process Side** - A controlled area at the FEMP where the former production operations occurred.
- 10.10 **Radiological Facility** - A facility that does not meet or exceed the hazard category 3 threshold values published in Table A.1 of DOE-STD-1027-92, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports, but contains some quantity of radioactive material (above those discussed in Appendix B to 40 CFR 302). (DOE-EM-STD-5502-94) (DOE-STD-1027)
- 10.11 **Safety Analysis** -A documented process that provides systematic identification of hazards within a given DOE operation; describes and analyzes the adequacy of measures taken to eliminate, control, or mitigate identified hazards; and analyzes and evaluates potential accidents and their associated risks. (DOE Order 5480.23)

Title: SAFETY ASSESSMENT HAZARD SCREENING AND CLASSIFICATION <i>Compliance with this procedure is mandatory while performing the activities within its scope. Only a controlled copy may be used in the performance of work.</i>	DOCUMENT NO: NS-0003	
	Effective Date: 11/30/97	Revision No. 2
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- 10.12 Safety Assessment - FEMP Form FS-F-2706, Request for Safety Analysis Support. A brief, factual, and objective document used for new facilities, projects and activities to:
- a. Screen the activity, project, or facility to determine if non-standard industrial hazards exist;
 - b. If non-standard industrial hazards exist, provides for the performance of an integrated hazard analysis;
 - c. Provides for the documentation of nuclear hazard categorization, radiological hazard categorization, and chemical hazard classification;
 - d. Document the need for additional safety analyses, e.g., ASR, SAR, HAR.
 - e. Document a request for Human Factors Evaluation (HFE)
 - f. Document a request for other Safety Analysis Team support.
- 10.13 Safety Assessment Plan - A plan that defines the approved path for the in-depth Safety Assessment hazard classification. The Safety Assessment Plan can range in size and scope from a simple statement of the expected results to a complex plan, including deliverables, depending on the complexity of the project.
- 10.14 Safety Basis - A combination of information relating to the control of hazards at a facility (including design, engineering analyses, and administrative controls) upon which the DOE depends for its conclusion that activities at the facility can be conducted safely. (DOE Order 5480.23) Or in the case of FDF-approved safety basis documents, ...upon which FDF depended for its conclusion that the addressed activity, project, or facility can be performed, conducted, or operated safely.
- 10.15 Standard Construction Activity - Any construction, alteration, demolition, repair, maintenance, or renovation of structures, substrates, or portions thereof, that do not possess the potential for releasing significant quantities of radiological and/or hazardous materials; i.e., do not meet or exceed 40 CFR 302 quantities.
- 10.16 Standard Industrial Hazard (SIH) - Hazards that are routinely encountered in general industry and construction, and for which national consensus codes and/or standards (e.g., OSHA, transportation safety) exist to guide safe design and operation without the need for special analysis to define safe design and/or operational parameters. (DOE-STD-3009-94)
- 10.17 Subcontractor - All non-FDF employees requiring access to the FEMP for the purpose of providing supplies, services, or construction activity in performance of a contractual obligation. Onsite employees of other DOE prime contractors will be considered subcontractors.

**Title: SAFETY ASSESSMENT HAZARD
SCREENING AND CLASSIFICATION**

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**TABLE 1 - EXAMPLES OF PROJECTS AND FACILITIES
DEFINED AS STANDARD INDUSTRIAL HAZARDS (SIH)**

A Safety Assessment is NOT required when an activity listed in this table is performed outside the process side of the FEMP. When the listed activities are inside the process area they are FEMP SIHs, and must be screened by System Safety.

1. Parking lots, storage yards, railroad spurs, and new roads.
2. Routine resurfacing of roads and railroad repair.
3. Re-roofing.
4. HVAC modifications not related to containment systems for hazardous material.
5. Modifications to noncritical utility systems such as:
 - (a) Sanitary water distribution system.
 - (b) Water treatment plant.
 - (c) Utility pole replacement.
 - (d) Burial of power lines.
 - (e) Coal and ash handling.
 - (f) Wells and raw water supply systems.
6. Structural, electrical, and service piping modifications (including sprinkler system modifications) in administrative buildings, such as instrument and machine shop areas that are non-process related (decontamination areas are not included).
7. Building additions and new buildings to serve administrative, non-process, or research functions.
8. Telecommunications systems.
9. Lighting systems.
10. Fencing.
11. Security equipment and facilities (covered by Security Vulnerability and Risk Assessment).
12. Metering for energy conservation and utilities monitoring.
13. Motor vehicles and heavy mobile equipment not to be used for transporting hazardous materials.
14. Standard machining tools (not involving fissile or radioactive materials) such as:
 - (a) Lathes.
 - (b) Boring mills, or
 - (c) N/C drills.
15. Elevator installations.
16. ADP equipment with no process control functions.
17. Scales (with possible exception of those used for nuclear material withdrawal).
18. Cooling tower fan motor replacements.
19. Furnaces used to heat buildings.
20. Laboratory equipment such as:
 - (a) Mass spectrometers.
 - (b) X-ray diffraction equipment, or
 - (c) Mechanical test and inspection equipment.
21. Storage facilities (except those used for fissile, radioactive, or hazardous materials).
22. Environmental sampling stations.
23. Meteorological stations.
24. Screens for cooling tower basins.
25. Instrument shop equipment.
26. Standard sanitary landfills.
27. Standard construction, routine maintenance, and industrial activities that do not involve radiological or chemical hazards exceeding final regulatory quantities in 40 CFR 302.4.

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TABLE 2 - SAFETY ASSESSMENT APPROVAL AND DISTRIBUTION LIST

Distribution	Form FS-F-2706	Safety Assessment Report (if prepared)	Safety Assessment Supporting Documentation Package
FDF Requestor	X	X	
FDF Requesting Organization Manager/Engineer	A, X	A, X	
FDF Coach of OS&H	X	X	
FDF Coach of Safety Analysis	A, X	A, X	
Author	X	X	
FDF Safety Analysis File	M	M	M
DOE-FEMP	X	X	
FDF Coach of Construction Safety	X	X	
Engineering Document Control (File Record Storage Copy)	X	X	
Chairman, Independent Safety Review Committee (ISRC)	X	X	
P/QA ORR/RA Coach	X	X	

Legend:

- X Receives copy.
- A Approves Safety Assessment.
- M Maintains master file copy (i.e., record copy) of original issue and all subsequent revisions.

NOTE: Safety Assessment revisions are distributed to Engineering Document Control. Additional distribution is at the discretion of the SA Coach using a graded approach.

Title: SAFETY ASSESSMENT HAZARD SCREENING AND CLASSIFICATION <i>Compliance with this procedure is mandatory while performing the activities within its scope. Only a controlled copy may be used in the performance of work.</i>	DOCUMENT NO: NS-0003	
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ATTACHMENT A - REQUEST FOR SAFETY ASSESSMENT

<h1 style="margin: 0;">S</h1> <h2 style="margin: 0;">REQUEST FOR SAFETY ASSESSMENT</h2>		DATE:	
TO: Safety Analysis Coach		FROM (NAME OF REQUESTOR): <i>(Please type or print)</i> PHONE: LOCATION/MS:	
REQUEST THAT A SAFETY ASSESSMENT BE PREPARED FOR THE FOLLOWING PROJECT:			
PROJECT TITLE:			
ASSOCIATED OR PREVIOUSLY ISSUED Safety Assessment NUMBER:		CHARGE NUMBER:	DATE REQUIRED: <i>(Please do not use ASAP. Allow a minimum of two weeks for standard, minimum, turn-around time.)</i>
CHECK ONE BLOCK ONLY			
<input type="checkbox"/> HAZARD SCREENING <i>(For Standard Industrial Facilities or Standard Construction activities only)</i>		<input type="checkbox"/> HAZARD CLASSIFICATION <i>(For all Nuclear, Radiological, Non-Nuclear, or Hazardous Waste Handling Facilities)</i>	
PROJECT DESCRIPTION (PROVIDE A BRIEF DESCRIPTION AND/OR ATTACH DOCUMENTATION DESCRIBING THE PROJECT):			
<h1 style="font-size: 100px; margin: 0;">L E</h1>			
SIGNATURE OF REQUESTOR:			DATE:
SIGNATURE OF REQUESTING ORGANIZATION MANAGER/COACH: <i>Please print or type</i>			DATE:

Title: SAFETY ASSESSMENT HAZARD SCREENING AND CLASSIFICATION <i>Compliance with this procedure is mandatory while performing the activities within its scope. Only a controlled copy may be used in the performance of work.</i>	DOCUMENT NO: NS-0003	
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ATTACHMENT A (cont.)

S	REQUEST FOR SAFETY ASSESSMENT	
	<i>(This section to be filled in by SA Coach or Designated SA Lead)</i>	
SAFETY ASSESSMENT IDENTIFICATION NUMBER:		The request to provide a Safety Assessment by the date required is accepted. SA Lead/Analyst: _____ Phone No.: _____
A	SAFETY ASSESSMENT RESULTS	
	<i>(This section to be filled in by SA Lead/Analyst Named Above)</i>	
A Safety Assessment has been performed for the project described in this form. The facility or activity described in this request has been assigned the following preliminary hazard classification:		
NUCLEAR <input type="checkbox"/> Hazard Category 1 <input type="checkbox"/> Hazard Category 2 <input type="checkbox"/> Hazard Category 3 <input type="checkbox"/> Presently documented under an existing DOE approved Safety Basis (refer to justification below)	M	NON-NUCLEAR (Chemical & Other non-standard hazards) <input type="checkbox"/> Hazard Classification High <input type="checkbox"/> Hazard Classification Moderate <input type="checkbox"/> Hazard Classification Low
RADIOLOGICAL <input type="checkbox"/> Hazard Category 4 <input type="checkbox"/> Radiological Facility		(OTHER) INDUSTRIAL <input type="checkbox"/> Hazardous Waste Activity <input type="checkbox"/> Standard Industrial Hazard (SIH) or Construction Activity <input type="checkbox"/> FEMP SIH or construction activity (contamination covered by permits)
P	REQUIRED DOCUMENTATION AND APPROVAL	
	<input type="checkbox"/> Graded SAR/TSR (DOE Approval) <input type="checkbox"/> USQD (FDF and DOE Approval) <input type="checkbox"/> ASR/PR (DOE Approval) <input type="checkbox"/> ASR/PR (FDF Approval) <input type="checkbox"/> Standard industrial or standard construction hazard (includes FEMP standard). no additional analysis required from the Safety Analysis Department	
L	JUSTIFICATION:	
	E	
SIGNATURE OF SA LEAD/ANALYST:		DATE:
SIGNATURE OF COACH, SAFETY ANALYSIS:		DATE:
SIGNATURE OF REQUESTING ORGANIZATION MANAGER/COACH:		DATE:

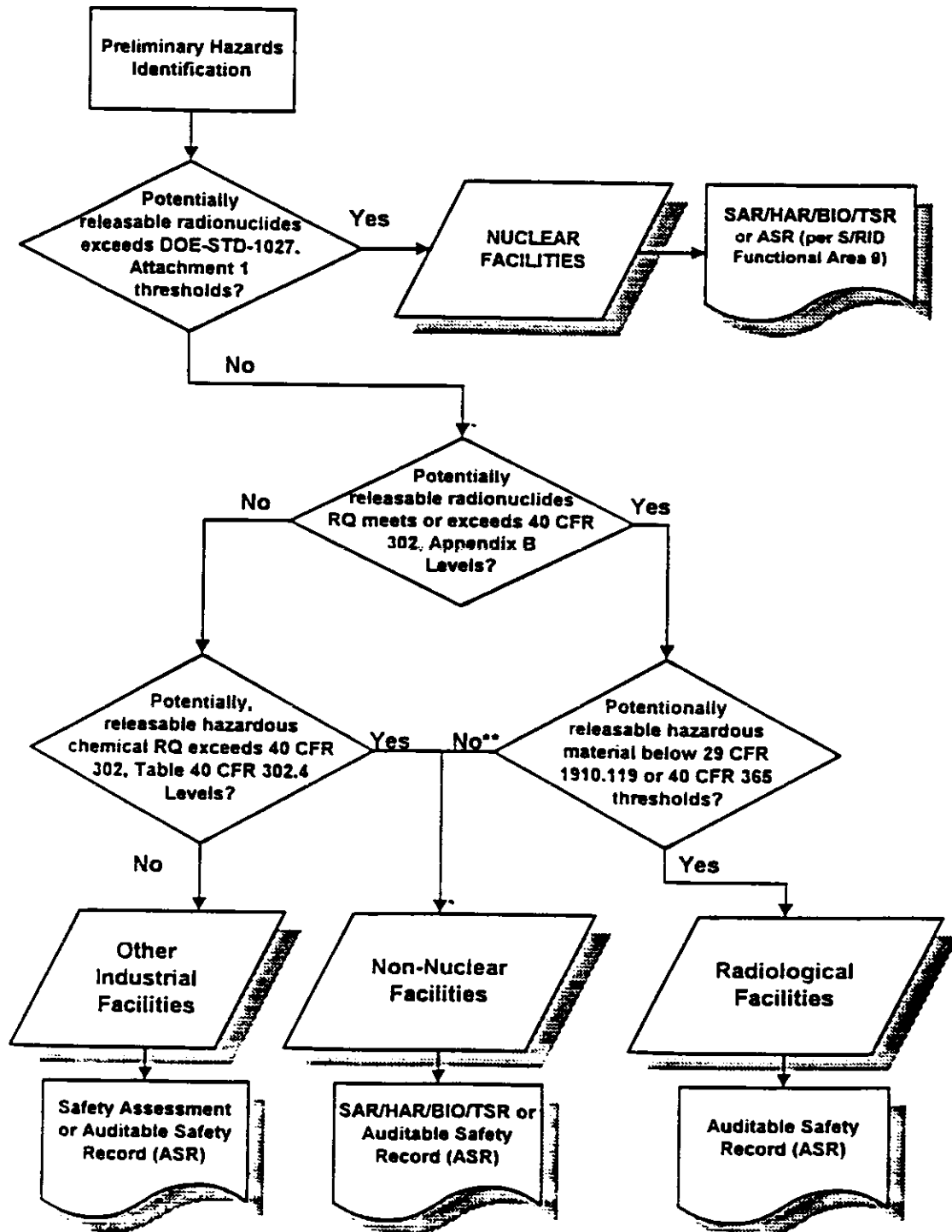
Title: SAFETY ASSESSMENT HAZARD SCREENING AND CLASSIFICATION <i>Compliance with this procedure is mandatory while performing the activities within its scope. Only a controlled copy may be used in the performance of work.</i>	DOCUMENT NO: NS-0003	
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ATTACHMENT B - ACRONYMS AND ABBREVIATIONS

ACRONYMS

ANSI	American National Standards Institute
ARF	Airborne Release Fraction
ASA	Auditable Safety Analysis
ASR	Auditable Safety Record
BIO	Basis for Interim Operation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DOE	Department of Energy
EPA	Environmental Protection Agency
FDF	Fluor Daniel Fernald
FEMP	Fernald Environmental Management Project
HASP	Health and Safety Plan
IHA	Integrated Hazard Analysis
NFPA	National Fire Protection Association
ORR	Operational Readiness Review
OS&H	Occupational Safety and Health
PR	Process Requirements
RCRA	Resource Conservation and Recovery Act
S&H	Safety and Health
SAR	Safety Analysis Report
SIH	Standard Industrial Hazard
STD	Standard
TSR	Technical Safety Requirement
USQD/SE	Unreviewed Safety Question Determination and Safety Evaluation
WSRC	Westinghouse Savannah River Corporation

ATTACHMENT C - EM HAZARD BASELINE DOCUMENTATION PROCESS



****Radiological Facility with Non-nuclear Facility documentation**

ADDENDUM 1

SAFETY ASSESSMENT GUIDELINES



Fernald Environmental Management Project
United States Department of Energy

SAFETY ASSESSMENT GUIDELINES

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SAFETY ASSESSMENT GUIDELINES

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SAFETY ASSESSMENT GUIDELINES

1.0 BACKGROUND

Site Procedure NS-0003 establishes the process by which Fernald Environmental Restoration Management Corporation (FERMCO) performs a Safety Assessment (SA). This addendum provides technical and administrative guidance to the System Safety Section technical staff on Fernald Environmental Management Project (FEMP) management approved approaches for performing the SA tasks defined in NS-0003. As indicated in NS-0003, other alternative approaches may be equally acceptable for performing the SA tasks. Alternative approaches shall be approved by the Manager of System Safety prior to use. Each project will have unique requirements which will require the System Safety Technical Specialists to employ their engineering judgement and apply sound principles of project management.

2.0 DEFINITIONS

Auditable Safety Record (ASR) - Documentation that contains the Auditable Safety Analysis (ASA) for radiological facilities and certain low hazard non-nuclear facilities at the FEMP, ensuring that construction, operation, maintenance, shut down, cleanup, and decommissioning activities can be safely performed in compliance with applicable laws, regulations, and requirements. An ASR may be employed when a SA concludes that further safety analysis is required.

Hazard - A source of danger (i.e., material, energy source, or operation) with the potential to cause illness, injury, or death to personnel or damage to a facility or to the environment (without regard for the likelihood or credibility of accident scenarios or consequence mitigation).

Project - A defined set of activities pursued towards a defined final conclusion. Examples of projects at the FEMP include the remedial investigation/feasibility studies for each operable unit, removal site evaluations, and removal actions.

Safety Analysis - A documented process to:

1. Provide systematic identification of hazards within a given DOE operation;
2. Describe and analyze the adequacy of measures taken to eliminate, control, or mitigate identified hazards; and
3. Analyze and evaluate potential accidents and their associated risks.

Safety Analysis Report (SAR) - A report which documents the safety analysis for a nuclear facility to ensure that the facility can be constructed, operated, maintained, shut down, and decommissioned safely and in compliance with applicable laws and regulations.

Safety Assessment (SA) - A brief, factual, and objective document which determines if activities involve hazards (other than those standard to industry) that require elimination, control, or mitigation, thereby establishing the need for a safety analysis and documentation.

SAFETY ASSESSMENT GUIDELINES

Significant Hazard - A credible source of danger (i.e., material, energy source, or operation) with the unmitigated potential to cause illness, serious injury, or death to personnel or damage to a facility or to the environment as defined in project specific significance criteria.

3.0 GUIDELINES

3.1 SAFETY ASSESSMENT PLAN

The Safety Assessment Plan (SAP) defines the approved path forward for the Preliminary Hazard Analysis (PHA) and the in-depth SA hazard classification. Prior to developing the SAP, the System Safety Technical Specialist should develop an agreement on the content with the FEMP organization that requested the SA. Also, the Manager of System Safety shall approve the general agreement and direction/outcome of the SAP.

As a minimum, the following items should be considered in the SAP development:

1. Documentation of plan if a written plan is required.
2. Support requirements outside of the System Safety Section.
 - a. Criticality analysis
 - b. PHA team composition
 - Working members
 - Review team
 - c. Process analysis
3. Project sponsor interface and/or interaction.
4. Lessons learned from industry experience.
5. The use of alternative approaches for establishing the preliminary hazard classification for NS-0003 Steps 7.5 and 7.6.
6. Availability of resources within the System Safety Section and other organizations.
7. SA schedule with interim milestones.
8. SA and customer's budget.
9. Expected results.
10. Deliverables and the contents of the SA supporting documentation package.
11. Review and approval cycles.
12. How the SAP supports the customer's needs for the project.

SAFETY ASSESSMENT GUIDELINES

Each project will have unique features requiring the engineering judgement of the System Safety Engineer who is developing the SAP.

Table 3.1-1 presents a typical outline for a written SAP.

3.2 PRELIMINARY HAZARD ANALYSIS

The Preliminary Hazard Analysis (PHA) is designed to be used during the concept and early development of a project to determine the hazards that exist. Figure 3.2-1 presents the flowpath for the PHA process. Engineering judgement is required in determining what project specific steps are to be included in the PHA.

The PHA should be a collaborative effort of safety, design, operations, and management representatives. The PHA team may consist of one or more representatives from the following disciplines:

1. project sponsor, *
2. designer *
3. system safety, *
4. operator (if available), *
5. occupational safety, *
6. industrial hygiene,
7. fire safety,
8. radiation,
9. criticality,
10. construction safety,
11. project engineer, and
12. others (as required).

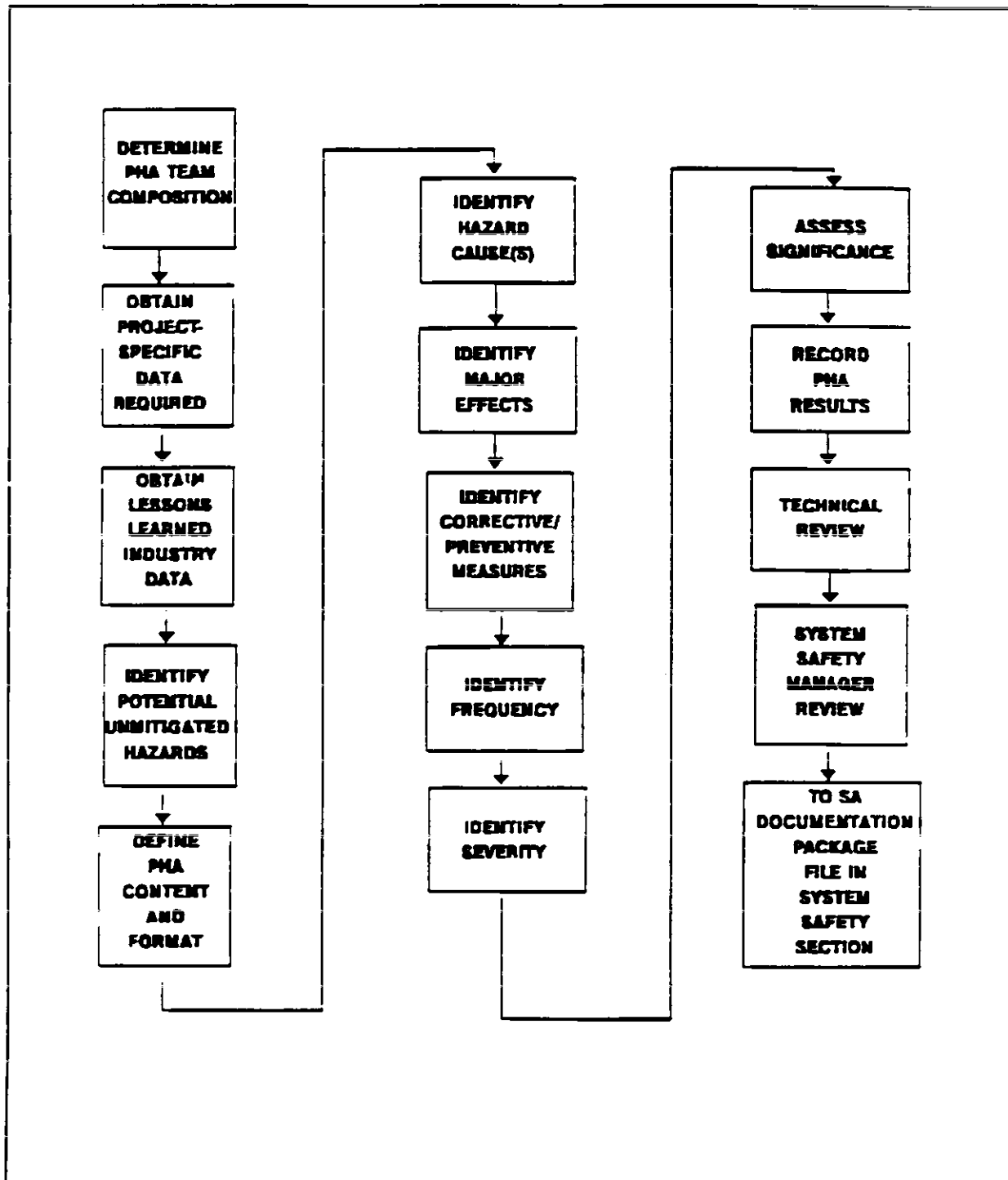
*generally required, as a minimum

TABLE 3.1-1 - SAFETY ASSESSMENT PLAN OUTLINE

1.0 Approach
A. Tasks and analyses to be performed
<ul style="list-style-type: none">• Additional data input requirements• Additional FERMCO/contractor requirements
B. Expected results (including establishing the hazard category)
2.0 List of Deliverables
3.0 Schedule
A. Interim milestones
B. Deliverables
<ul style="list-style-type: none">• Start• Draft• Review cycle• Approval

SAFETY ASSESSMENT GUIDELINES

FIGURE 3.2-1 - PRELIMINARY HAZARD ANALYSIS PROCESS FLOWPATH



SAFETY ASSESSMENT GUIDELINES

3.2 PRELIMINARY HAZARD ANALYSIS (cont.)

The System Safety Technical Specialist should recommend the composition of the PHA working members and the PHA review team for approval by the Manager of System Safety. This mix of participants is often cause to call the PHA "integrated."

The PHA consists of the following basic steps:

1. Step 1 - gather the project/activity-specific needed information,
2. Step 2 - gather the available lessons learned from industry,
3. Step 3 - define the PHA content and format,
4. Step 4 - prepare a PHA, and
5. Step 5 - record the results.

Table 3.2-1 presents a typical format for a PHA worksheet. Other worksheet formats that contain the equivalent information are equally acceptable.

Columns 1 through 5 of the PHA Worksheet, Table 3.2-1, should be completed for all PHAs. General guidance for performing the PHA, (i.e., completing columns 1 through 5), is presented in Sections 4.4 and 6.4 of *Guidelines for Hazard Evaluation Procedures* (Ref. 4.3). For some projects, there may be a requirement to initiate procurement of long lead items before a PHA is approved. For these projects, and for other unique cases, there may be a requirement to complete the last three columns on the PHA Worksheet:

- Column 6 Frequency,
- Column 7 Severity, and
- Column 8 Significant Hazard.

Table 3.2-2 presents the hazard frequency of occurrence classification information that should be used as the basis for completing column 6. Table 3.2-3 presents the hazard consequence classification that should be used to classify the severity of the unmitigated hazard consequence in column 7. Table 3.2-4 provides guidance for determining if the hazard is designated as a significant hazard. If the intersection of the hazard consequence and the hazard frequency falls within the shaded area on Table 3.2-4, the hazard is designated as a significant hazard and column 8 is marked "Yes." If the intersection is outside of the shaded area, the hazard is not designated as a significant hazard and column 8 is marked "No."

Page 1 of ____

Project No.: _____

Safety Assessment Identification No.: _____

[illegible]

SAFETY ASSESSMENT GUIDELINES

TABLE 3.2-2- QUALITATIVE FREQUENCY CLASSIFICATION

Descriptive Word	Estimated Annual Probability of Occurrence	Description
Anticipated	$p > 10^{-2}$	Incidents that may occur several times during the lifetime of the facility.
Unlikely	$10^{-2} \geq p > 10^{-4}$	Accidents that are not anticipated to occur during the lifetime of the facility.
Extremely Unlikely	$10^{-4} \geq p > 10^{-6}$	Accidents that will probably not occur during the life cycle of the facility.
Incredible	$10^{-6} \geq p$	All other accidents.

TABLE 3.2-3 - HAZARD CONSEQUENCE⁽¹⁾

	Worker Safety	Worker Radiation Exposure	Worker Chemical Exposure	Public Radiation Exposure	Public Chemical Exposure	Public Safety
High		≥ 250 Rem	\geq ERPG-3	≥ 25 Rem	\geq ERPG-2	≥ 5 Serious Injuries
Moderate	1 Fatality or ≥ 5 Serious Injuries ⁽²⁾	≥ 5 but < 250 Rem	\geq ERPG-2	≥ 0.5 but < 25 Rem	\geq ERPG-1	≥ 1 but < 5 Serious Injuries
Low	≥ 1 but < 5 Serious Injuries ⁽²⁾	≥ 0.5 but < 5 Rem	\geq ERPG-1	≥ 0.01 but < 0.5 Rem	PEL-TWA	Minor Injuries
Very Low	Minor Injuries	< 0.5 Rem	$<$ ERPG-1	< 0.01 Rem and other legal limits on normal emissions	EPA and other legal limits on normal emissions ⁽²⁾	

NOTES:

1. The criteria presented in this table are for the purpose of determining hazard significance only. Other criteria may exist for determining hazard classification.
2. For the purpose of this table, serious injury is defined as an injury that results in a lost time injury.

SAFETY ASSESSMENT GUIDELINES

TABLE 3.2-4 - CRITERIA FOR HAZARD SIGNIFICANCE

Estimated Annual Probability of Occurrence		Hazard Consequence			
		Below Concern	Low	Moderate	High
Anticipated	$p > 10^{-2}$				
Unlikely	$10^{-2} \geq p > 10^{-4}$				
Extremely Unlikely	$10^{-4} \geq p > 10^{-6}$				
Incredible	$10^{-6} \geq p$				

The shaded area bounded by the dark line indicates significant hazards.

3.3 ASSESSMENT AND CLASSIFICATION OF RADIOLOGICAL HAZARDS

Projects involving the excavation, transportation, processing, or placement of soil-like materials in which the PHA has determined that the bounding accident is a severe wind event will use, if appropriate, the current "Procedures for Evaluation of Particulate Emissions from Area Sources During a Worst-Case Wind Event at the FEMP" (reference 4.23) to determine the (1) maximum quantities of dispersible radiological and hazardous chemical materials, and (2) the maximum radiological dose and chemical exposure from the wind event. These results will, in turn, determine the facility/activity hazard classification when compared to DOE-EM-STD-5502-94 hazard classification criteria.

This section provides guidelines for conducting an assessment of a facility's radiological hazards and developing the Hazard Categorization. Definitions for the hazard categories are provided in Section 3.3.2. Facilities that are classified as either Category 1, 2, or 3 are required to comply with DOE Order 5480.23 [Ref. 4.6] and have a SAR. The hazard category and hazard assessment will be reevaluated during the SAR preparation and may be revised.

Facilities that do not meet or exceed Hazard Category 3 threshold criteria, but still possess some amount of radioactive material greater than 40 CFR 302.4 Reportable Quantity (RQ), may be considered Radiological Facilities. Radiological Facilities are exempt from DOE Order 5480.23 but they are not exempt from the need for issuing an Auditable Safety Record (ASR) to address non-standard industrial hazards and other safety requirements such as those contained in DOE Order 5481.1B [Ref. 4.8] and DOE Order 5480.11 [Ref. 4.5].

SAFETY ASSESSMENT GUIDELINES

3.3.1 General Guidelines

The purpose of the hazard categorization process is to determine the significance of the hazards inherent to the activity or process. The hazard category is then used to ensure that appropriate controls, procedures and processes are applied to the design features to control unmitigated hazards and make them acceptable.

3.3.1.1 Segmentation

The requirements for an assessment and hazard categorization are specified in DOE Order 5480.23. Additional guidance for performing the assessment and classification, including radionuclide threshold values, can be found in DOE-STD-1027-92 [Ref. 4.7]. The requirements state that a hazards analysis and categorization is to be performed on independent facility segments which may be processes, operations, or activities and not necessarily on whole facilities. The process for determining a facility's Hazard Category should allow for defining independent facility segments in which facility features preclude bringing material in any two or more segments together or causing harmful interaction from a common severe phenomena.

3.3.1.2 Containment

Sealed sources, commercially available products and DOT shipping containers may qualify for special treatment in the assessment of radiological hazards. Sealed radioactive sources that are engineered to pass the special form testing specified by the Department of Transportation (DOT) in 49 CFR 173.469 or testing specified by ANSI N43.6 [Ref. 4.16] may be excluded from summation of a facility's radioactive inventory.

Hazardous radiological materials used in exempted, commercially available products, should not be considered part of a facility's inventory. These materials are described in 10 CFR 30 Parts 30.11 - 30.19 and include timepieces, illumination devices, thermostats, electron tubes, microwave receiver tubes, and similar products. Material contained in DOT Type B shipping containers may also qualify to be excluded from summation of a facility's radioactive inventory.

3.3.2 Radiological Hazard Categories

A facility or facility segment may be classified as either Category 1, 2, or 3 or as a radiological facility based on an analysis of the radiological hazards that have the potential for harm to workers or the public. Information on these categories is provided in this section. A facility may also be classified in relation to the chemical hazards that it contains. Chemical hazard classification is addressed in Section 3.4.

SAFETY ASSESSMENT GUIDELINES

3.3.2.1 Hazard Category 1

A Hazard Category 1 facility is one in which analysis shows that there is a potential for significant off-site consequences. Category 1 facilities include Category A reactors and facilities designated by the Program Secretarial Officer (PSO). There are no facilities at the FEMP that satisfy the criteria to be designated Category 1.

3.3.2.2 Hazard Category 2

A Hazard Category 2 facility is one in which analysis shows that there is a potential for significant on-site consequences. Category 2 facilities will contain quantities of hazardous radiological materials which meet or exceed the threshold values listed in DOE-STD-1027-92 [Ref. 4.7]. Category 2 facilities include those with the potential for a nuclear criticality or with sufficient quantities of hazardous materials and energy, which would require on-site emergency planning activities. This category of facilities contains Category B reactors and the most significant nonreactor nuclear facilities within the DOE complex.

DOE-STD-1027-92 defines that the radiological criterion for a Category 2 facility is derived from 10 CFR 30 [Ref. 4.19]. This criterion is essentially the possession of quantities of radioactive material.

In addition, any facility containing fissile material in quantities greater than theoretical minimum mass limits for criticality emergencies as specified in ANSI 16.1 [Ref. 4.17] should be designated a Category 2 facility. For aqueous solutions of U_{233} , U_{235} , and Pu_{239} , these values are 500, 700, and 450 grams, respectively. Credit may be taken if segmentation or the nature of the process precludes the potential for a criticality.

3.3.2.3 Hazard Category 3

A Hazard Category 3 facility is one in which analysis shows that there is a potential for only significant localized consequences. The radiological criterion for a Category 3 facility is that it contains releasable quantities of hazardous radiological materials which meet or exceed the threshold inventory values listed in DOE-STD-1027-92. This category of facilities by definition cannot release the quantities of materials which could threaten workers at adjacent facilities, the public, or the environment.

Category 3 is designed to capture facilities which largely include laboratory operations, low level waste handling facilities, and research facilities which possess less than the Category 2 quantities of releasable material and are considered to represent a low hazard.

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3.3.2.4 Radiological Facilities

A facility or facility segment that does not meet the criteria for Category 1, 2, and 3, but does contain small releasable amounts of radiological material greater than 40 CFR 302.4 final RQ, is designated a Radiological Facility, per DOE-EM-STD-5502-94.

3.3.3 Hazard Classification Decision Process

The process provides a method for assessing potential hazards and does not consider potential risk. Based on analysis, a facility or facility segment may be classified as either Category 2 or 3. Facilities that do not meet or exceed Hazard Category 3 threshold criteria, but still possess some amount of radioactive material in excess of 40 CFR 302.4 RQ, may be considered Radiological Facilities.

Threshold inventory values for important radionuclides have been specified by the DOE and are listed in Table A-1 of DOE-STD-1027-92 [Ref. 4.7]. Shown there are threshold values for determining if a facility or facility segment is a Category 2 or 3.

3.3.4 Determining a Facility's Hazard Category

The facility's hazard category is determined by performing the following:

1. Identify the facility or facility segment which will be assigned the hazard category. A facility segment must be independent of other facility segments and this independence must be demonstrated.
2. Estimate the radiological inventory by isotope, at equilibrium, including its daughters. This estimate should be based on the maximum inventory, i.e., the material at risk (MAR), that may be in the facility or if applicable, the facility segment.
3. Define the accident and the associated facility airborne release fractions (ARF) for each isotope (the isotopes include the daughters).
4. Adjust the hazard category thresholds of each isotope by the ratios of the DOE-STD-1027-92 release fractions, divided by the facility ARF.
5. Finally, facilities or facility segments where there are combinations of radioactive materials should be designated as Category 2 or 3 if the sum of the ratios of the quantity of each material to the Category 2 or 3 adjusted thresholds exceeds one (e.g., $[\text{Inventory of isotopes A} / \text{adjusted thresholds of isotope A}] + [\text{inventory of isotope B} / \text{adjusted threshold of isotope B}] + [\text{inventory of isotope n} / \text{adjusted threshold of isotope n}] > 1$).

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3.4 ASSESSMENT AND CLASSIFICATION OF CHEMICAL OR NON-NUCLEAR HAZARDS

Projects involving the excavation, transportation, processing, or placement of soil-like materials in which the PHA has determined that the bounding accident is a severe wind event will use, if appropriate, the current "Procedures for Evaluation of Particulate Emissions from Area Sources During a Worst-Case Wind Event at the FEMP" (reference 4.23) to determine the (1) maximum quantities of dispersible radiological and hazardous chemical materials, and (2) the maximum radiological dose and chemical exposure from the wind event. These results will, in turn, determine the facility/activity hazard classification when compared to DOE-EM-STD-5502-94 hazard classification criteria.

This section provides guidelines for conducting an assessment of a facility's chemical hazards and developing the Hazard Classification.

3.4.1 General Guidelines

DOE Order 5480.23 [Ref. 4.6] places new emphasis on already existing requirements concerning the protection of workers, the public, and the environment against all hazards. The Order requires that the analysis and safety basis of occupational and nonradiological hazards be documented in the SAR. Facilities may be designated as Hazard Class High, Medium, or Low based on DOE Order 5481.1B [Ref. 4.8]. Definitions for the chemical hazard classes are provided in Section 3.4.2. Guidelines for determining the chemical hazard class are provided in Section 3.4.5.

Occupational hazards, including industrial hazards, that are identified in the hazards analysis and that are clearly regulated by DOE-prescribed occupational safety and health (OSH) standards should be segregated from non-routine hazards. OSH requirements and referenced standards for nonradiological hazards can be found in DOE Orders 3790.1B [Ref. 4.10], 5483.1A [Ref. 4.9], and 5480.10 [Ref. 4.4].

3.4.2 Chemical Hazard Classes

Facilities may be designated as either Hazard Class High, Medium, or Low as defined below:

Low-Those hazards which present minor onsite and negligible offsite impacts to people or the environment;

Moderate-Those hazards which present considerable potential for onsite impacts to people or the environment but, at most, only minor offsite impacts;

High-Those hazards with the potential for onsite or offsite impacts to large numbers of persons or for major impacts to the environment.

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3.4.3 Hazard Classification and Decision Process

The chemical hazards classification process is illustrated in Figure 3.4-1. The process provides a method for assessing potential hazards and does not consider potential risk.

3.4.4 Hazard Classification Guidelines

Hazards should be classified as either High, Moderate, Low, or None based on DOE Order 5481.1B. The ERPG (Emergency Response Planning Guideline) values are the only well-documented parameters developed, to date, specifically for use in evaluating the health consequences of exposure to the general public of accidental releases of extremely hazardous chemicals. The ERPG values are published by the American Industrial Hygiene Association [Ref. 4.14].

In effect, ERPG-3 values represent the threshold concentration for lethal effects, while ERPG-2 values represent the threshold for severe or irreversible toxic effects in exposed populations.

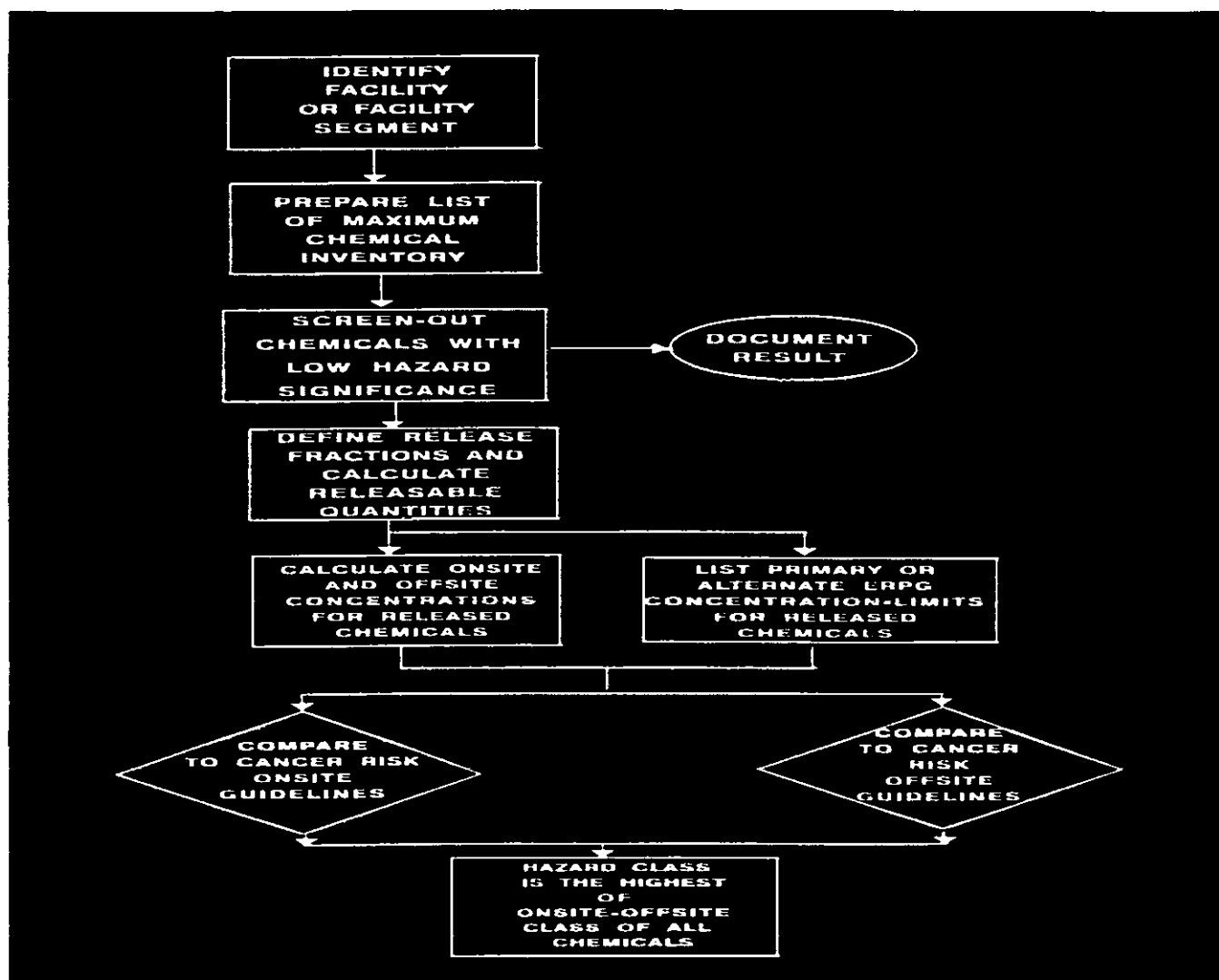
Table 3.4-1 should be used for determining nonradiological hazard categorization levels for chemicals in nuclear facilities.

3.4.5 Chemical Hazards Classification Process

In order to determine the hazard class, the concentration at specified distances of each chemical that is released in an accident must be estimated for comparison with the guidelines. This section provides guidance for chemical hazards classification.

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FIGURE 3.4-1 - CHEMICAL HAZARD CLASSIFICATION DECISION PROCESS



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TABLE 3.4-1 - RECOMMENDED NONRADIOLOGICAL HAZARD
CATEGORIZATION GUIDELINES FOR USE WITH DOE ORDER 5480.23

HAZARD CATEGORY	RECEPTOR LOCATION	RECOMMENDED GUIDELINES
1	OFFSITE	≥ ERPG-3
2	ONSITE	≥ ERPG-3
3	LOCAL	≥ ERPG-3

- NOTE:**
- These guidelines are to be applied as follows:
 - Concentrations are first calculated as peak 15-minute average values, and this is the applicable value for all chemicals for which the toxicity effect is immediate (i.e., concentration-dependent, e.g. irritants, corrosives, and any chemical that has a PEL-STEL, PEC-C, TLV-STEL or TLV-C value).

If this procedure appears to yield overly conservative results for chemicals whose toxic effects depend upon the total quantity of chemicals taken into the body (i.e., dose-dependent), then for those chemicals only, the peak 1-hour average concentration may be used as the basis for comparison with the guideline concentrations.

Class D stability and a windspeed of 4.5 m/s is used, and no credit may be taken for plume meander or building wake effects.

3.4.5.1 Identification of Hazardous Chemical Inventory

The first step in chemical hazards classification is to identify the inventory of hazardous chemicals in the facility or facility segment that are at risk in the event of an accident. A facility segment must be independent of other facility segments and this independence must be demonstrated. Depending on each chemical's characteristics and the dynamics of the accident, the amounts of chemicals released will vary between 0% and 100% of inventory. Release fractions defined for each chemical by the analyst are used to determine the amount of each chemical released.

Since a facility may contain numerous different chemicals, and recognizing that not all chemicals are safety concerns, the hazard classification process can be simplified by:

1. including only those chemicals that have the potential for significant hazards and
2. screening out all chemicals with inventories below 40 CFR 302.4 (Ref. 4.15) limits.

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3.4.5.1 Identification of Hazardous Chemical Inventory (cont.)

The types of factors that determine the degree of hazard any given chemical represents include:

1. physicochemical properties that contribute to the chemical's dispersibility, reactivity, and incompatibility with other chemicals;
2. a chemical's inherent toxicity; and
3. the conditions under which the chemical is stored and/or used including its quantity.

The WSRC report [Ref. 4.11, p.11] lists several questions which can be used as criteria for screening the chemicals in inventory to decide which ones to analyze in detail. In the section that follows, only those chemicals that were not screened out should be considered for hazard classification. All chemicals that are screened-out should be identified and documented to demonstrate that all chemicals in the inventory listing have been considered.

3.4.5.2 Determining Onsite and Offsite Concentrations

The next step is to determine the onsite and offsite concentrations of each chemical that is released in the accident. A suitable model may be used for this purpose. Use of a straight-line Gaussian dispersion model is recommended. The dispersion model used will be compatible with the source term. A discussion of Gaussian dispersion models with examples can be found in NUREG/CR-3332 [Ref. 4.18] and *Workbook of Atmospheric Dispersion Estimates* [Ref. 4.20].

3.4.5.3 Determine Hazard Classification

The final step is to compare the calculated concentrations for the onsite and offsite receptors to the criteria using the guidelines provided in Table 3.4-2 to determine the Hazard Class. The primary concentration-limit parameters have been developed and published by the American Industrial Hygiene Association [Ref. 4.13]. A list of 88 chemicals and their concentration-limit values can be found in Table A3-2 of the WSRC report [Ref. 4.11].

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TABLE 3.4-2 - RECOMMENDED NONRADIOLOGICAL HAZARD CLASSIFICATION GUIDELINES

Hazard Class	Primary Concentration/Cancer Risk Guidelines	
	Onsite	Offsite
High	-	≥ ERPG-3
Moderate	≥ ERPG-3	≥ ERPG-2 < ERPG-3
Low	≥ ERPG-2 < ERPG-3	≥ ERPG-1 < ERPG-2

Source: Table 1, WSRC-MS-92-206 [Ref. 4.11]

- NOTE:**
- These guidelines are to be applied as follows:
 - Concentrations are first calculated as peak 15-minute average values, and this is the applicable value for all chemicals for which the toxicity effect is immediate (i.e., concentration-dependent, e.g., irritants, corrosives, and any chemical that has a PEL-STEL, PEC-C, TLV-STEL or TLV-C value).

If this procedure appears to yield overly conservative results for chemicals whose toxic effects depend upon the total quantity of chemicals taken into the body (i.e., dose-dependent), then for those chemicals only, the peak 1-hour average concentration may be used as the basis for comparison with the guideline concentrations.

Class D stability and a windspeed of 4.5 m/s is used, and no credit may be taken for plume meander or building wake effects.

The primary concentration-limit guidelines should be used if values for the chemicals of interest have been published. If the primary guidelines are not available, then the hierarchy of alternative concentration-limit parameters presented in Table 3.4-3 should be used, in the order presented, on the basis of availability of parameters for the chemicals of interest. A list of 88 chemicals and their alternative concentration limits can be found in the WSRC report [Ref. 4.11, Table 6]. Note that even though the concentration-limit parameters used as guidelines are associated with various averaging times, the concentrations calculated for comparison with the guideline concentration should be the peak 15-minute average concentration and not the average concentration for the time period associated with the guideline. However, if this leads to unduly restrictive results for chemicals for which the toxic effects are known to be dose-dependent rather than concentration-dependent, then the concentration may be averaged over not more than 1 hour.

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TABLE 3.4-3 - RECOMMENDED HIERARCHY OF ALTERNATIVE CONCENTRATION-LIMIT PARAMETERS (ERPG-EQUIVALENT VALUES)

Primary Guideline	Hierarchy Group	Hierarchy of Alternative Guidelines	Source of Concentration Parameter
ERPG-3	1	EEGL (30-min) IDLH	Ref. 4.18 Ref. 4.20 Ref. 4.21
ERPG-2	2	EEGL (60-min) LOC PEL-C TLV-C TLV-TWA x 5*	Ref. 4.18 Ref. 4.20 Ref. 4.14 Ref. 4.19 Ref. 4.17 Ref. 4.17
ERPG-1	3	PEL-STEEL TLV-STEEL TLV-TWA x 3*	Ref. 4.18 Ref. 4.19 Ref. 4.17 Ref. 4.17
PEL-TWA	4	TLV-TWA SPEGL (60-min) CEGL	Ref. 4.18 Ref. 4.19 Ref. 4.20 Ref. 4.20

Source: Table 4, WSRC-MS-92-206 [Ref. 4.11]

* Applicable only to chemicals whose effects are dose-dependent

NOTES:

- The protocol is to use the primary guidelines first and then the alternative guidelines in the order presented to each hazard level when the primary guideline does not exist.
- Calculate the peak 15-minute average concentration at the receptor point of interest (e.g., the site boundary).
- Compare with the relevant concentration-limit guideline value. The ratio gives the hazard index (HI), which should be ≤ 1 to be acceptable.
- Make no adjustment for time for which concentration-limit guideline value was developed.
- Are toxic effects of chemical immediate (by definition, any chemical that has a PEL-STEEL, PEL-C, TLV-STEEL, or TLV-C value)?
- If not, toxic effects are assumed to be dose-dependent, unless information to the contrary is available, i.e.,

$$D \text{ (mg)} = C \text{ (mg/m}^3\text{)} \times R \text{ (m}^3\text{/min)} \times T \text{ (min)} \times 1 \text{ (absorbed fraction)}$$

For these dose-dependent chemicals only, the peak 1-hour average concentration may be used. Note that there are chemicals which exert concentration-dependent effects that also exhibit dose-dependent effects at lower concentrations, e.g., benzene.
- If application of this hierarchy to a particular chemical gives rise to a value for a lower hazard class that is higher than the value for the next higher hazard class (e.g., ERPG-1-equivalent value greater than ERPG-2-equivalent value), then that value should be adjusted downwards to match that of the next higher hazard class (see Table 6 for examples).

NOTE: Some substances may cause immediate irritation, even with very short exposures, e.g. hydrogen sulfide.

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Appendix 4 of the WSRC report [Ref. 4.11] provides guidance on the development of guideline concentrations for chemicals without published values.

The protocol is to use the primary guidelines first and then the alternative guidelines in the order presented for each hazard when the primary guideline does not exist.

If application of this hierarchy to a particular chemical gives rise to a value for a lower class that is higher than the value for the next higher hazard class (e.g., ERPG-1-equivalent value greater than ERPG-2-equivalent value), then that value should be adjusted downwards to match that of the next higher hazard class.

3.5 OTHER NON-STANDARD HAZARDS

The System Safety Technical Specialist, assigned to complete the SA, should use their engineering judgement to decide if the project contains other hazards that would not be considered standard. An example may be a very large pressurized air receiver that could catastrophically fail and cause a release of hazardous materials, or multiple injuries. Other non-standard hazards should be identified in the SA. Future documentation required by the SA (SAR or ASR) should identify how these hazards are mitigated.

These other hazards will not generally drive a hazard category or classification unless they cause a bounding exposure due to hazardous materials.

3.6 COMPLETING THE SAFETY ASSESSMENT

The SA process has two phases, the preliminary hazard screening phase and the more in-depth hazard assessment and classification phase. In the event that during the preliminary hazard screening phase it is determined that all of the potential hazards are standard industrial and/or construction hazards, or that a potential Unreviewed Safety Question (USQ) may be introduced, the SA process can be closed out with a brief SA. Section 3.6.1 provides guidance on closing out a brief SA. Section 3.6.2 provides guidance on closing out the SA if the assessment was continued into the hazard assessment and classification phase. Figure 3.6-1 presents the process flowpath for completing the SA.

3.6.1 Brief Safety Assessment

The safety assessment supporting documentation package should be assembled before page 2 of the *Request for Safety Assessment*, Form FS-F-2706 is completed. The typical supporting documentation package for a brief safety assessment will normally contain:

1. Form FS-F-2706.
2. Copies of reference documentation that are not maintained and controlled by FERMCO or the Manager of System Safety, and

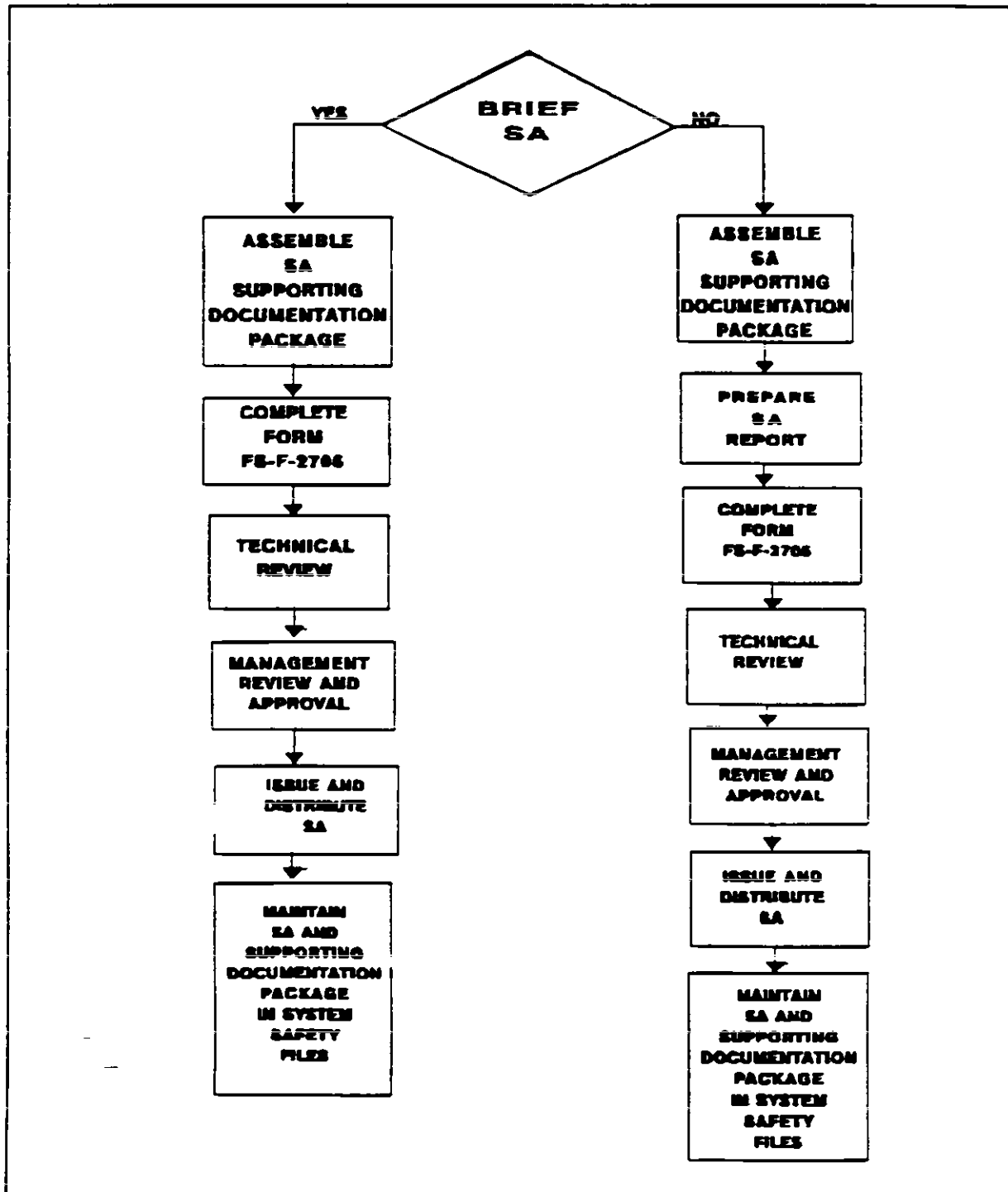
SAFETY ASSESSMENT GUIDELINES

3. Applicable notes, worksheets, and calculations that provide the basis for determining that there is a potential USQ or that only standard industrial and/or construction hazards exist.
4. Brief SA distribution list.

Normally for a brief SA, a SA Report is not prepared. Summary statements that provide the basis for the brief SA hazard screening results and the justification for the hazard classification and additional required documentation will be stated on page 2 of Form FS-F-2706. Additional pages can be attached to the form if required.

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FIGURE 3.6-1 - SAFETY ASSESSMENT PROCESS FLOWPATH



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3.6.2 Expanded Safety Assessment

The safety assessment supporting documentation package should be assembled before page 2 of the *Request for Safety Assessment*, Form FS-F-2706 and the SA Report are completed. The typical supporting documentation package is defined in Section 7.6 of NS-0003 [Ref. 4.1].

The SA Report should be attached to Form FS-F-2706. The hazard classification results and the additional required documentation will be stated on page 2 of Form FS-F-2706. The "JUSTIFICATION" block on Form FS-F-2706 should reference the attached SA Report. Table 3.6-1 presents a suggested outline for the SA Report.

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TABLE 3.6-1 - SAFETY ASSESSMENT REPORT OUTLINE

1.0	PURPOSE State the purpose of the SA.
2.0	DESCRIPTION OF ACTIVITY/FACILITY/PROJECT Provide a brief description of the activity, facility, or project as applicable. Also indicate if segmentation is used in the SA.
3.0	SUMMARY AND HAZARD CLASSIFICATION/CATEGORY Summarize the hazard classification or category and the basis for the facility/project/activity classification(s). Summarize the required level of new documentation required, the appropriate level of approval, and any interaction with DOE in defining the documentation requirement and/or the level of approval.
4.0	HAZARD SCREENING FINDINGS Identify the basis for not terminating the SA after the hazard screening phase.
5.0	PRELIMINARY HAZARD ANALYSIS Include the completed Preliminary Hazard Analysis (PHA) Worksheets, Table 3.2-1. Present significant findings of the PHA. Discuss the effects without mitigation and with mitigation when applicable. The significant findings may be candidates for accident analysis.
6.0	RADIOLOGICAL HAZARDS Identify all radiological hazards. Discuss the basis for the facility classification. If no radiological hazards exist, indicate that there are no radiological hazards.
7.0	NON-RADIOLOGICAL HAZARDS Identify all non-radiological (i.e., chemical) hazards. Discuss the basis for the facility classification. If no non-radiological hazards exist, indicate that there are no non-radiological hazards.
8.0	INDUSTRIAL HAZARDS Identify standard and non-standard industrial hazards. If no industrial hazards exist, indicate that there are no industrial hazards.
9.0	CONSTRUCTION HAZARDS Identify standard and non-standard construction hazards. If no construction hazards exist, indicate that there are no construction hazards.
10.0	NEW DOCUMENTATION REQUIREMENTS Indicate the required level of new documentation required, the basis for the documentation requirement, and the appropriate level of approval. Discuss any interaction with DOE in defining the documentation requirement and/or the level of approval.

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4.0 REFERENCES

- 4.1 NS-0003, *Safety Assessment Hazard Screening and Classification*
- 4.2 RM-2116, *Safety Analysis Program Requirements*, Fernald Environmental Project
- 4.3 *Guidelines for Hazard Evaluation Procedures*, American Institute of Chemical Engineers, 1985
- 4.4 DOE Order 5480.10, *Contractor Industrial Hygiene Program*, U.S. Department of Energy, June 26, 1985
- 4.5 DOE Order 5480.11, *Radiation Protection for Occupational Workers*, U.S. Department of Energy, Change 3, June 17, 1992
- 4.6 DOE Order 5480.23, *Nuclear Safety Analysis Reports*, U.S. Department of Energy, April 30, 1992
- 4.7 DOE STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*, U.S. Department of Energy, December 1992
- 4.8 DOE Order 5481.1B, *Environment, Safety, and Health Program for Department of Energy Operations*, U.S. Department of Energy, March 27, 1990
- 4.9 DOE Order 5483.1A, *Occupational Safety and Health Program for DOE Contractor Employees*, U.S. Department of Energy, June 22, 1983
- 4.10 DOE Order 3790.1B, *Federal Employee Occupational Safety and Health Program*, U.S. Department of Energy, January 7, 1993
- 4.11 WSRC-MS-92-206, *Toxic Chemical Hazard Classification and Risk Acceptance Guidelines for Use in DOE Facilities*, D.K. Craig, et al, Westinghouse Savannah River Company, Rev. 1, April 1993
- 4.12 29 CFR 1910.119, *Process Safety Management of Highly Hazardous Chemicals; Explosives and Blasting Agents; Final Rule. Appendix A List of Highly Hazardous Chemicals, Toxics and Reactives*, Code of Federal Regulations: Labor, February 24, 1992
- 4.13 *Concepts and Procedures for the Development of Emergency Response Planning Guidelines (ERPGs)*, American Industrial Hygiene Association ERPG Committee, December 1989, (New data sets are issued as they are developed)

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4.0 REFERENCES (cont.)

- 4.14 USGPO 1991 517-003/47004, *Emergency Planning for Extremely Hazardous Substances*, U.S. Environmental Protection Agency, Federal Emergency Management Agency, and U.S. Department of Transportation, December 1987
- 4.15 40 CFR 302, *List of Hazardous Substances and Reportable Quantities*, Code of Federal Regulations: Protection of Environment, Table 302.4, pp 228-298, July 1, 1991 Edition
- 4.16 Turner, D. B., *Workbook of Atmospheric Dispersion Estimates*, Environmental Protection Agency, Office of Air Programs Publication No. AP-26, 1970
- 4.17 *Threshold Limit Values for Chemicals and Physical Agents and Biological Exposure Indices*, American Conference of Government Industrial Hygienists, Cincinnati, OH, 1992-1993
- 4.18 Emergency Response Planning Guidelines, American Industrial Hygiene Association ERPG Committee, American Industrial Hygiene Association, Akron, OH 1993
- 4.19 *Emergency and Continuous Exposure Guidance Levels for Selected Airborne Contaminants*, Vol. 1-7, Committee on Toxicology, Board on Toxicology and Environmental Health Standards, Commission on Life Sciences, National Research Council, National Academy Press, Washington D.C., 1985
- 4.20 *NIOSH Pocket Guide to Chemical Hazards*, U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, Washington D.C., 1990
- 4.21 IARC 1982a, *An Evaluation of Chemicals and Industrial Processes Associated with Cancer in Humans Based on Human and Animal Data*, International Agency for Cancer Research Working Group, IARC Monographs Volumes 1 to 20, Cancer Research, Vol. 40, pp 1-20 (1982)
- 4.22 IARC 1982b, *IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans*, International Agency for Cancer Research Working Group, Supplement 4, Lyon, France (Oct. 1982)
- 4.23 Procedure for Evaluation of Particulate Emissions from Area Sources During a Worst-Case Wind Event at the FEMP, Fluor Daniel, April 1996

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5.0 ACRONYMS

ANSI	-	American National Standards Institute
ARF	-	Airborne Release Fraction
ASA	-	Auditable Safety Analysis
ASR	-	Auditable Safety Record
CEGL	-	Continuous Exposure Guidance Level
CFR	-	Code of Federal Regulations
DOE	-	Department of Energy
DOT	-	Department of Transportation
EEGL	-	Emergency Exposure Guidance Level
ERPG	-	Emergency Response Planning Guideline
S&H	-	Safety and Health
FEMP	-	Fernald Environmental Management Project
FERMCO	-	Fernald Environmental Restoration Management Corporation
HASP	-	Health and Safety Plan
ICR	-	Incremental Chemical Risk
IDLH	-	Immediately Dangerous to Life and Health
IRIS	-	Integrated Risk Information System
LOC	-	Level of Concern
MAR	-	Material at Risk
NIOSH	-	National Institute of Occupational Safety and Health
NS	-	Nuclear and System Safety
OSH	-	Occupational Safety and Health
PEL	-	Permissible Exposure Limit
PEL-C	-	Permissible Exposure Limit - Ceiling
PEL-STEL	-	Permissible Exposure Limit - Short-Term Exposure Limit
PEL-TWA	-	Permissible Exposure Limit - Time Weighted Average
PHA	-	Preliminary Hazard Analysis
PSO	-	Program Secretarial Officer
OSH	-	Occupational Safety and Health
RQ	-	Reportable Quantity
SA	-	Safety Assessment
SAP	-	Safety Assessment Plan
SAR	-	Safety Analysis Report
SIH	-	Standard Industrial Hazard
SPEGL	-	Short-Term Public Emergency Guidance Level
STD	-	Standard
TLV-C	-	Threshold Limit Value - Ceiling
TLV-STEL	-	Threshold Limit Value - Short-Term Exposure Limit
TLV-C	-	Threshold Limit Value - Time Weighted Average
USQ	-	Unreviewed Safety Question
WSRC	-	Westinghouse Savannah River Company